

Pocket Reference Book

PRESENTED BY

JOHN PAUL

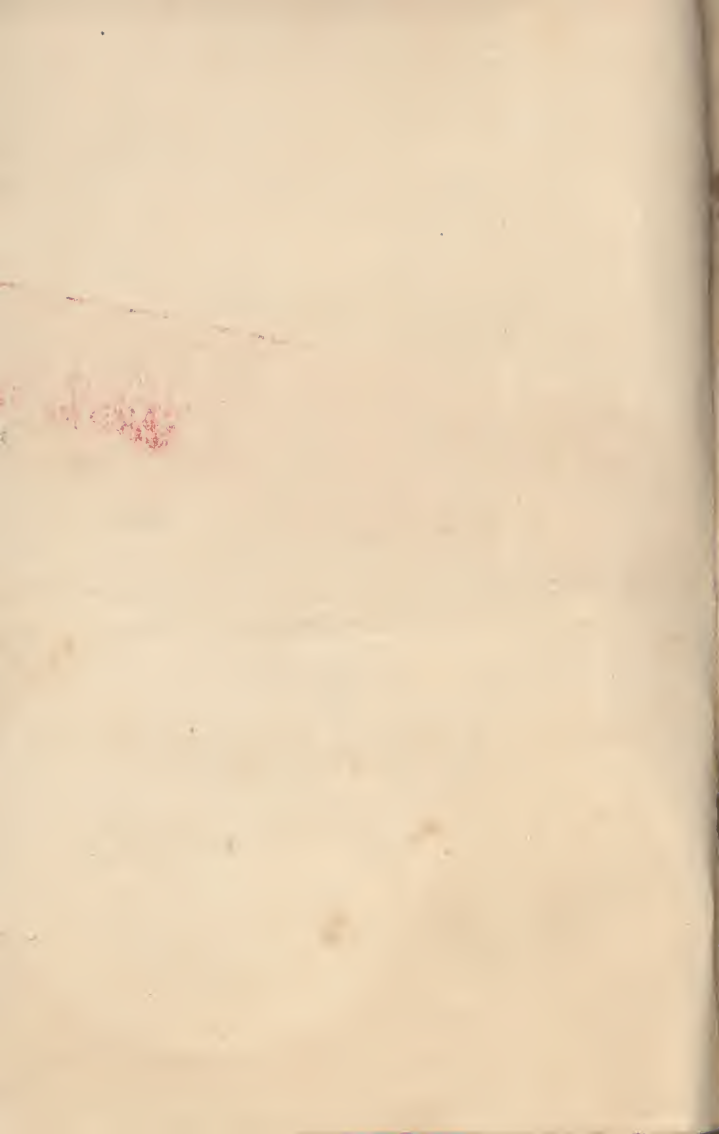
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LUMBER,
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SASH, DOORS, BLINDS, MOULDINGS,
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1885.

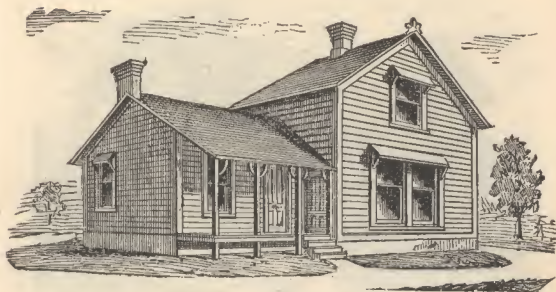
JOHN PAUL'S LUMBER CALCULATOR.

TWO INCH AND OVER.—NO. FEET IN EACH PIECE.

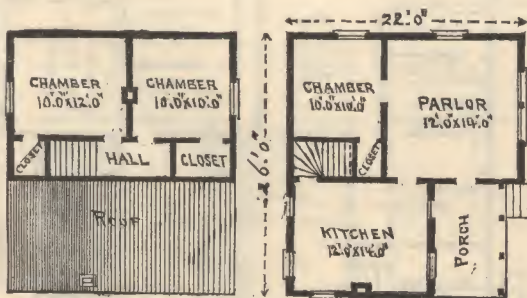
Length feet.	6	8	10	12	14	16	18	20	22	24	26	28	30
Size--- 2x 4	4	5½	6¾	8	9½	10¾	12	13½	14¾	16	17½	18¾	20
" --- 2x 6	6	8	10	12	14	16	18	20	22	24	26	28	30
" --- 2x 8	8	10¾	13½	16	18¾	21½	24	26¾	29½	32	34¾	37½	40
" --- 2x10	10	13½	16¾	20	23½	26¾	30	33½	36¾	40	43½	46¾	50
" --- 2x12	12	16	20	24	28	32	36	40	44	48	52	56	60
" --- 2x14	14	18¾	23½	28	32¾	37½	42	46¾	51½	52	60¾	65½	70
" --- 3x 4	6	8	10	12	14	16	18	20	22	24	26	28	30
" --- 4x 4	8	10¾	13½	16	18¾	21½	24	26¾	29½	32	34¾	37½	40
" --- 4x 6	12	16	20	24	28	32	36	40	44	48	52	56	60
" --- 6x 6	18	24	30	36	42	48	54	60	66	72	78	84	90
" --- 6x 8	24	32	40	48	56	64	72	80	88	96	104	112	120
" --- 8x 8	32	42¾	53½	64	74¾	85½	96	106¾	117½	128	138¾	149½	160
" --- 8x10	40	53½	66¾	80	93½	106¾	120	133½	146¾	160	173½	186¾	200
" --- 10x10	50	66¾	83½	100	116¾	133½	150	166¾	183½	200	216¾	23½	250
" --- 10x12	60	80	100	120	140	160	180	200	220	240	260	280	300
" --- 12x12	72	96	120	144	168	192	216	240	264	288	312	336	360

ORDER YOUR LUMBER OF JOHN PAUL.

DESIGN No. 1.

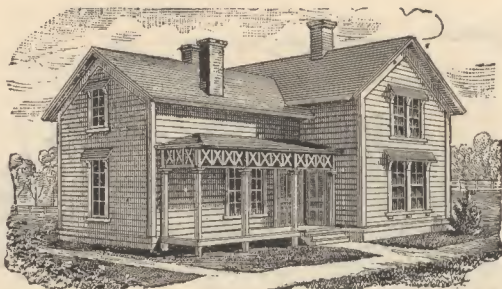


Five Room Cottage.

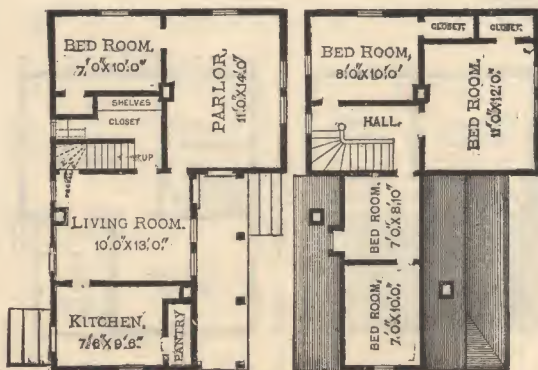


Very Cheap and Comfortable.

DESIGN No. 2.



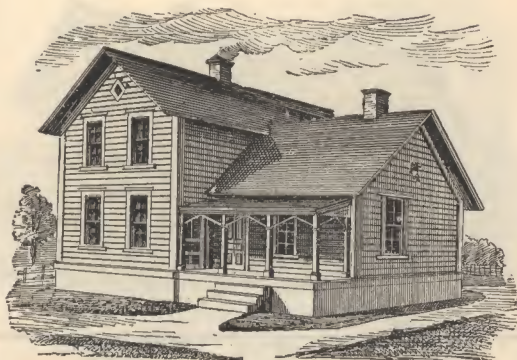
Eight Room Dwelling.



Suitable for Farm or Village.

Rural Architecture.

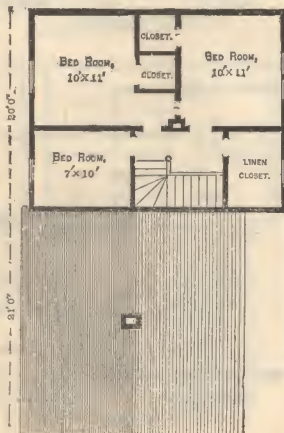
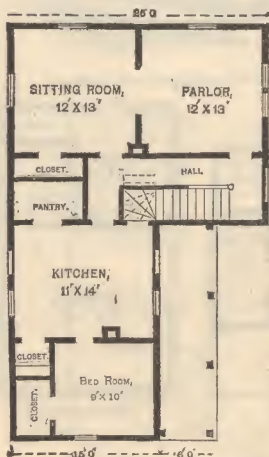
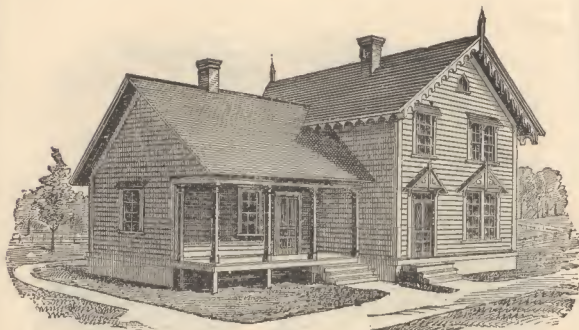
DESIGN No. 3.



A very convenient Five Room Cottage.

Rural Architecture.

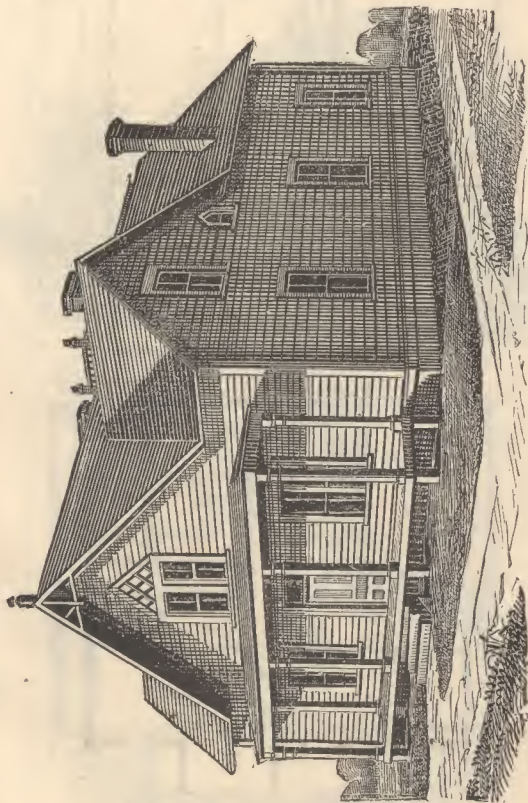
DESIGN No. 5.



An attractive and convenient Eight Room Cottage.

Rural Architecture.

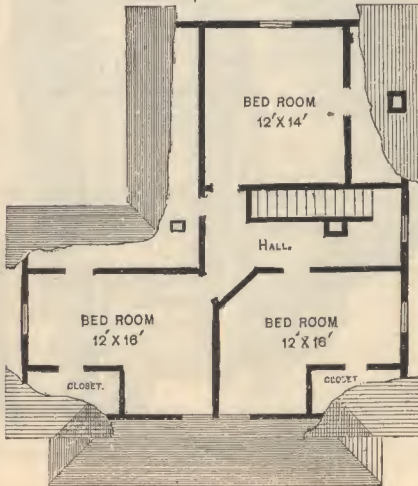
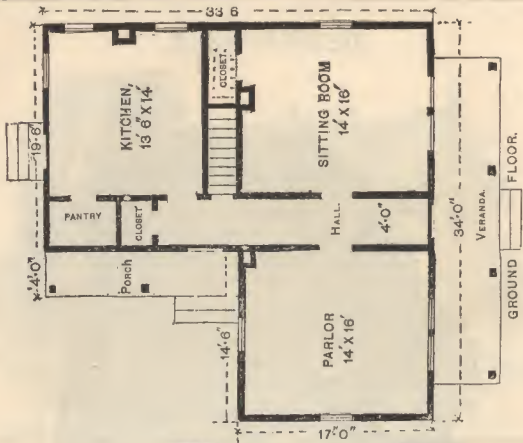
DESIGN No. 6.



A convenient Six Room House.

(See Plans on next page.)

Rural Architecture.



Plan for Design No 6.

Rural Architecture.

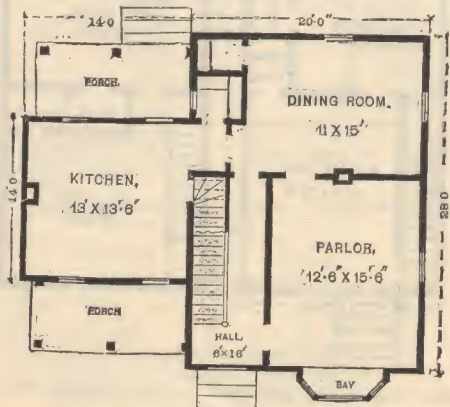
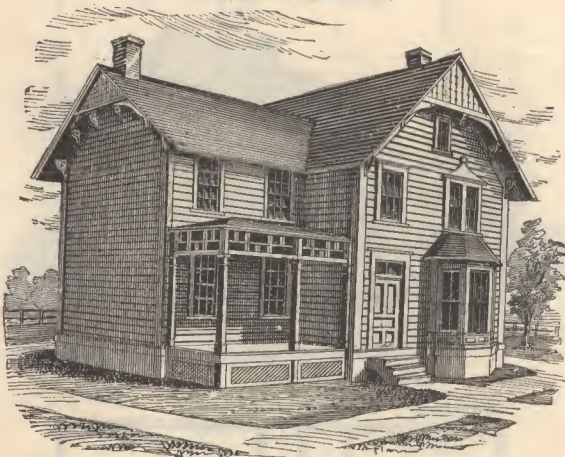
DESIGN No. 7.



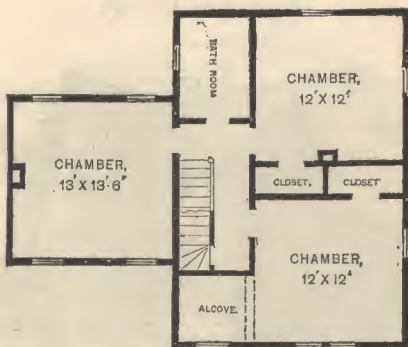
A very Cheap House for small Farm or Village Tenement.

Rural Architecture.

DESIGN No. 8.



Rural Architecture.



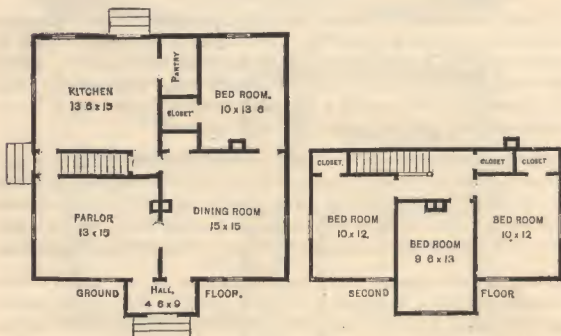
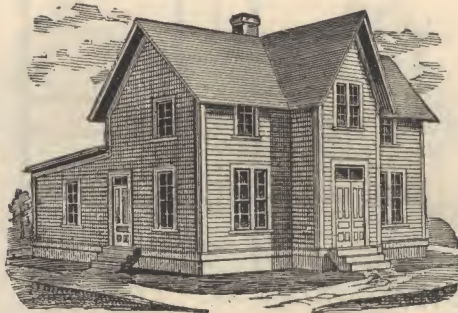
Second Story, Design No. 8.

To find the number of bricks required in a building: Rule—Multiply the number of cubic feet by $22\frac{1}{2}$. The number of cubic feet is found by multiplying the length, height and thickness (in feet) together. Bricks are usually made 8 inches long, 4 inches wide and 2 inches thick; hence it requires 27 bricks to make a cubic foot without mortar, but it is generally assumed that the mortar fills $\frac{1}{6}$ of the space.

Partitions unsupported from underneath the floors should be supported from the walls by means of a simple truss. This can be made by setting two pieces of scantling into the walls on either side, at the floor, to abutt against each other at the ceiling or against a collar-beam over the doors. This plan will obviate the sinking of floors so often seen under partitions.

Putty, for plastering, is a very fine cement made of lime only. It is thus prepared: Dissolve in a small quantity of water, as two or three gallons, an equal quantity of fresh lime, constantly stirring it with a stick until the lime be entirely slaked, and the whole becomes of a suitable consistency, so that when the stick is taken out of it, it will but just drop therefrom; this, being sifted or run through a hair sieve, to take out the gross parts of the lime, is fit for use. Putty differs from fine stuff in the manner of preparing it, and its being used without hair.

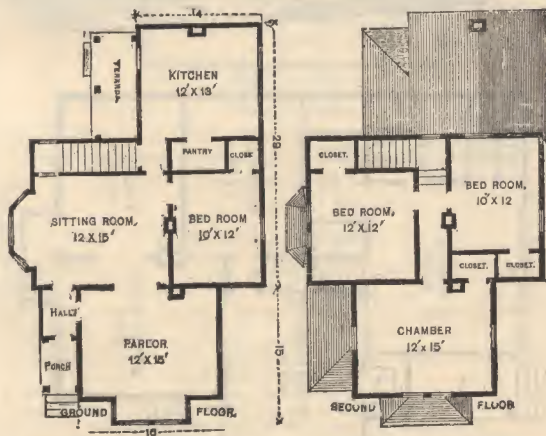
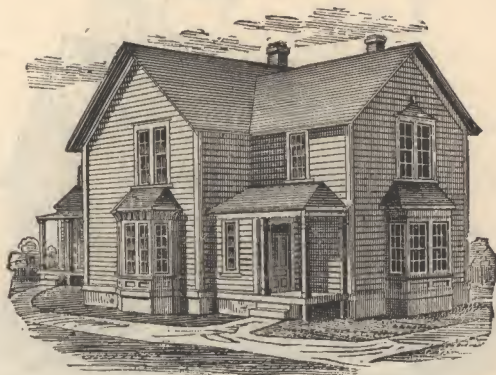
DESIGN No. 10.



This can easily be made larger by making it all two stories high, which would give quite a large house.

Rural Architecture.

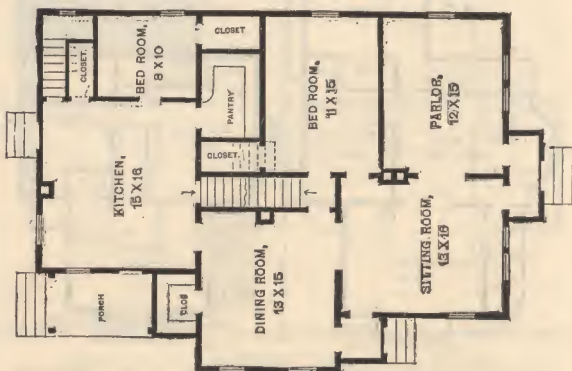
DESIGN No. 11.



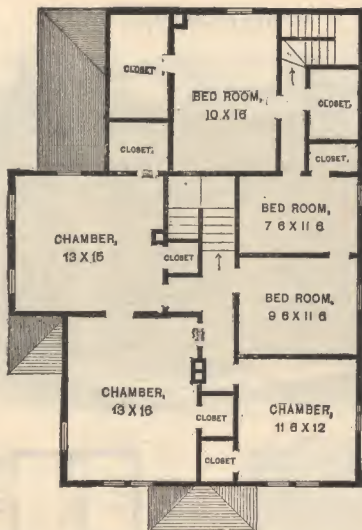
A very handsome and convenient Seven Room Residence.

Rural Architecture.

DESIGN No. 12.



Rural Architecture.



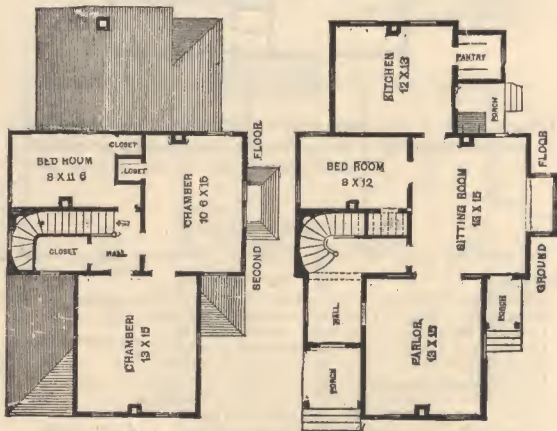
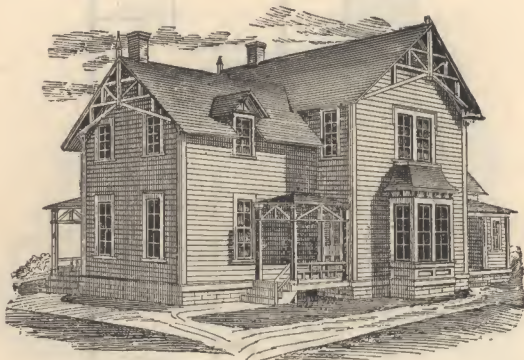
Design 12 is a very well arranged, large House, capable of accommodating a large family, thoroughly provided with closets, etc.

MEASURES OF CAPACITY.

The following table will often be found convenient, taking inside dimensions:

- A box 24 in. x 24 in. x 14.7 will contain a barrel of 31½ gallons.
- A box 15 in. x 14 in. x 11 in. will contain 10 gallons.
- A box 8¼ in. x 7 in. x 4 in. will contain a gallon.
- A box 4 in. x 4 in. x 3.6 in. will contain a quart.
- A box 24 in. x 28 in. x 16 in. will contain 5 bushels.
- A box 16 in. x 12 in. x 11.2 in. will contain a bushel.
- A box 12 in. x 11.2 in. x 8 in. will contain a half bushel.
- A box 7 in. x 6.4 in. x 12 in. will contain a peck.
- A box 8.4 in. x 8 in. x 4 in. will contain a half peck, or 4 dry quarts.
- A box 6 in. x 5 3-5 in., and 4 in. deep, will contain a half gallon.
- A box 4 in. x 4 in., and 2 1-10 deep, will contain a pint.

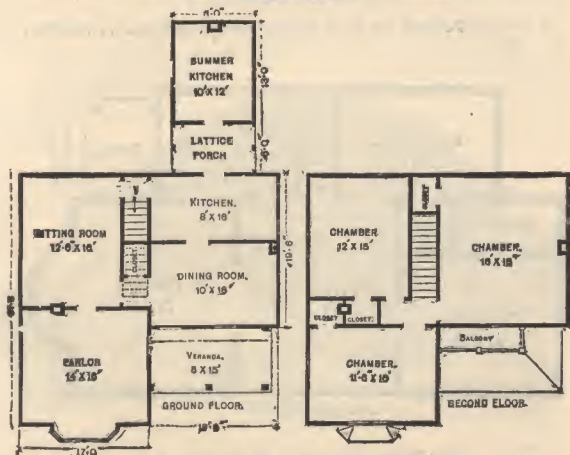
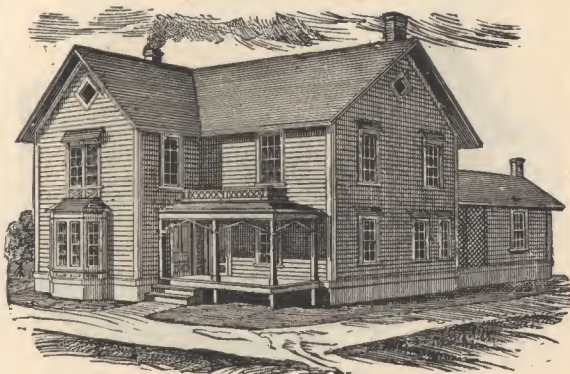
DESIGN No. 13.



Same size as No. 11. differently arranged.

Rural Architecture.

DESIGN No. 14.

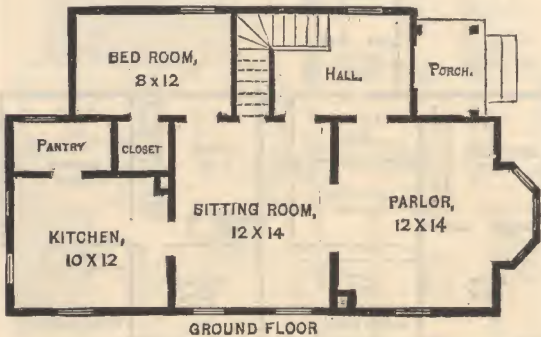


Convenient Eight Room Dwelling,

DESIGN No. 15.

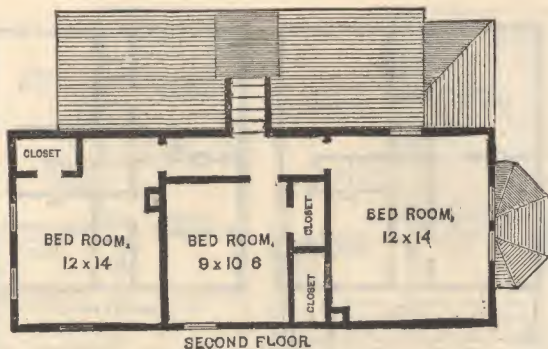


A Cheap Village or City House where ground is limited.

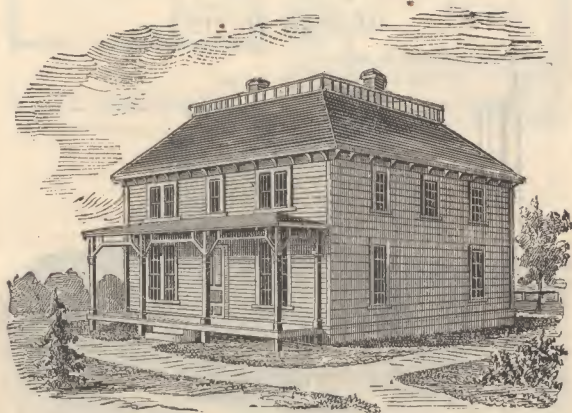


(For Plan of Second Story see opposite Page.)

Rural Architecture.

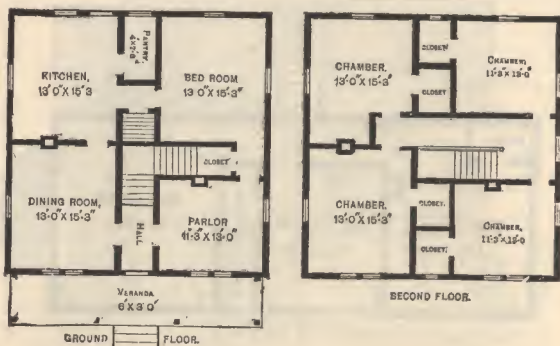


DESIGN No. 16.



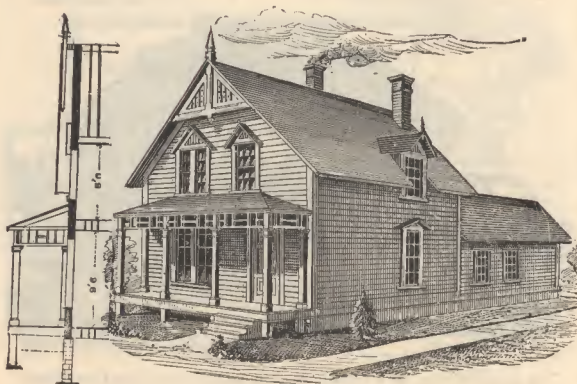
A good Farm or Village House, with room well utilized.

Rural Architecture.

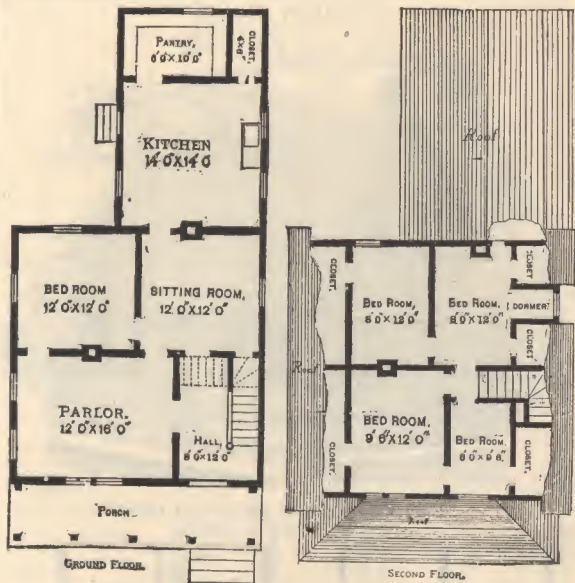


Plans of Design No. 16.

DESIGN No. 18



Rural Architecture.



Plans for Design No. 18.

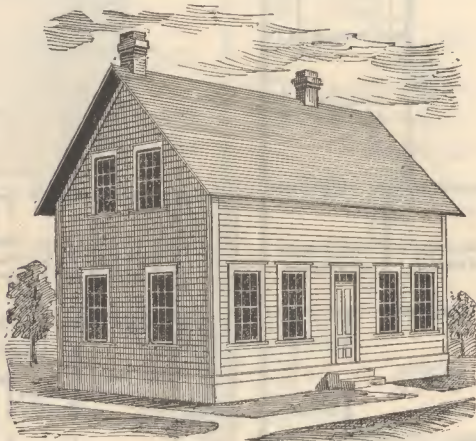
DIMENSIONS OF ONE ACRE.

A square, whose sides are 12,649 rods, or 69.57 rods, or 208.71 feet long, contains one acre. Table of dimensions of rectangle containing one acre:

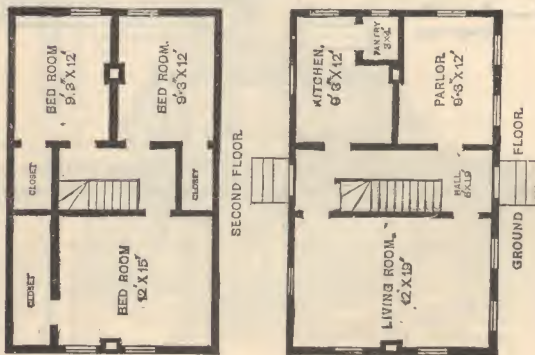
RODS.

1 × 160	1½ × 106⅔	2 × 80	2½ × 64
3 × 53⅓	3½ × 45 5-7	4 × 40	4½ × 35 5-9
5 × 32	5½ × 29 1-11	6 × 26⅔	6½ × 24 8-13
7 × 22 6-7	7½ × 21⅓	8 × 20	8½ × 18 14-17
9 × 17 7-9	9½ × 16 16-19	10 × 16	10½ × 15 5-21
11 × 14 6-11	11½ × 13 21-33	12 × 13⅓	12½ × 12 4-5
.....	12 13-20 × 12 13-20

DESIGN No. 19.

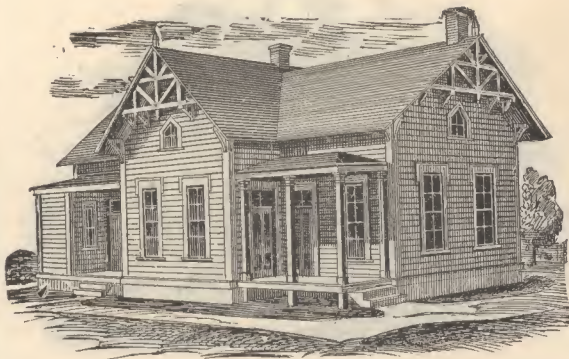


A very Cheap and convenient House.



Rural Architecture.

DESIGN No. 20.

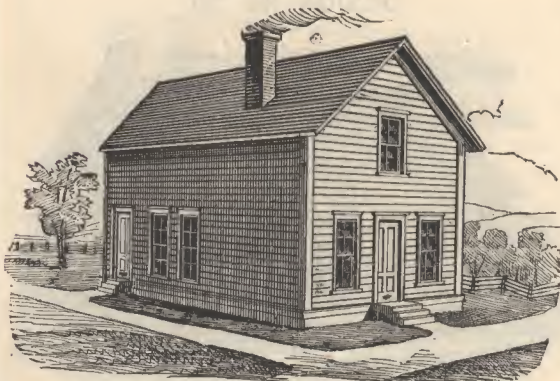


A Model One Story House.



Rural Architecture.

DESIGN No. 21.



A very Cheap Tenement.



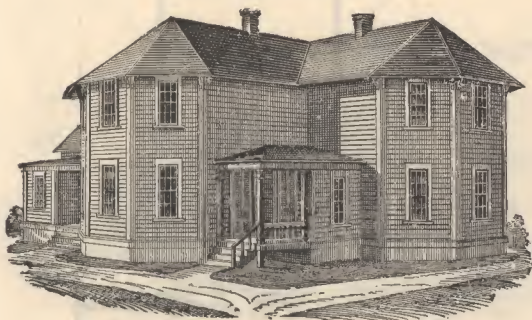
GROUND FLOOR.



SECOND FLOOR.

Rural Architecture.

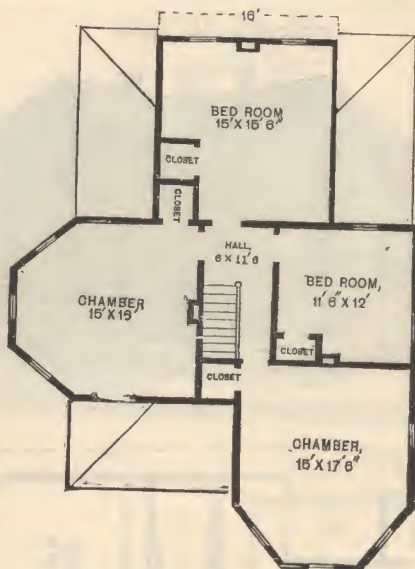
DESIGN No. 22.



A beautiful Village Residence.



Rural Architecture.



Second Story Plan Design No. 22.

NUMBER OF TREES REQUIRED PER ACRE.

4 feet apart each way.....	2,720	15 feet apart each way.....	200
5 " " 	1,742	18 " " 	135
6 " " 	1,200	20 " " 	110
8 " " 	680	25 " " 	70
10 " " 	430	30 " " 	50
12 " " 	325	33 " " 	40

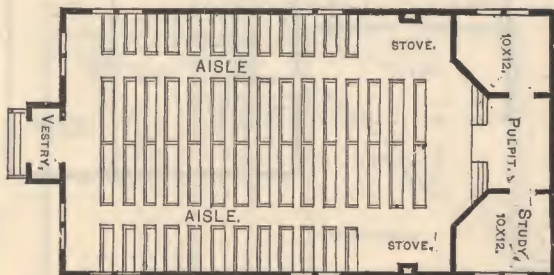
HAY MEASURE.—About 500 cubic feet of well-settled hay, or about 700 of new mown hay, will make a ton. To estimate amount of hay in mow—Ten cubic yards of meadow hay weigh a ton. When the hay is taken out of old stacks, 8 or 9 yards will make a ton. Eleven or 12 cubic yards of clover, when dry, make a ton. (*Note.*—The only accurate method to measure hay is to weigh it, since two quantities equal in bulk will never weigh alike. Any rule is simply an approximation.)

Rural Architecture.

DESIGN No. 23.



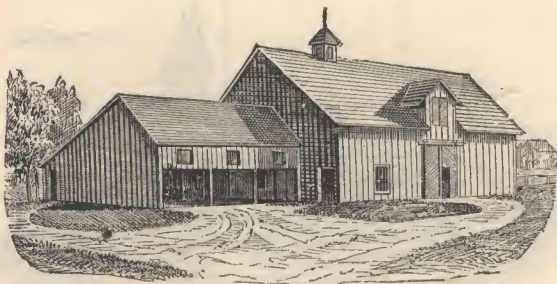
An attractive and Cheap Village or Country Church.



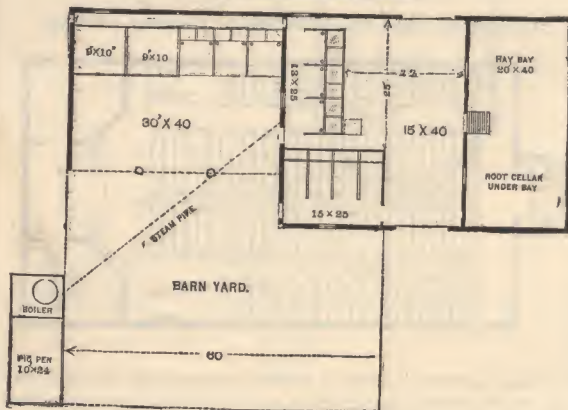
Building contracts, as all other business arrangements, should be written. A few moments' time spent in stating, clearly and concisely, what is expected of each party will often save delays and annoyances during the progress of the work and endless litigation after it. The mechanic's lien laws are a sufficient protection to the contractor or material-man, but their enforcement is much more simple and prompt if action can be based on a written contract.

Rural Architecture.

DESIGN No. 24.



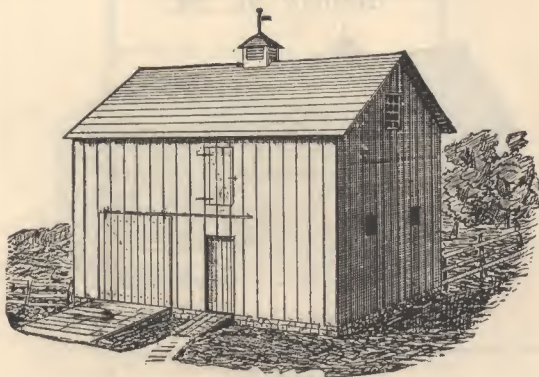
A very commodious Barn.



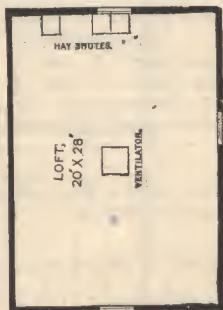
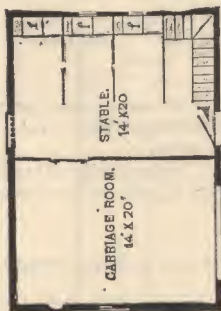
FLOOR, WALL AND ROOF MEASURE.—To find the number of square yards in a floor or wall: *Rule*—Multiply the length by the width or height (in feet), and divide the product by 9; the result will be square yards.

Rural Architecture.

DESIGN No. 25.

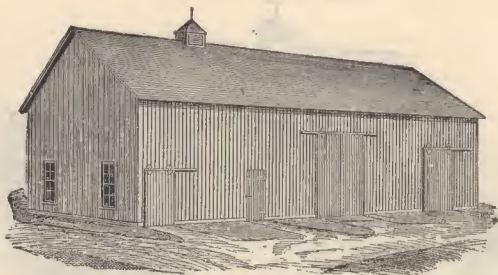


Cheap Horse Barn.



To find the contents of a corn crib: RULE—Multiply the number of cubic feet by $4\frac{1}{2}$ and point off one decimal place—the result will be the answer in bushels. How many bushels will a crib hold that is 48 feet long, $7\frac{1}{2}$ feet wide and $8\frac{1}{2}$ feet high? $48 \times 7\frac{1}{2} \times 8\frac{1}{2} = 3,060$ cubic feet; $3,060 \times 4\frac{1}{2} = 12,240$; $12,240 \div 1530 = 1377$. bushels, answer.

DESIGN No. 26.



A Finely Arranged Combination Barn.

(For Plan see opposite Page.)

ESTIMATES OF MATERIALS.

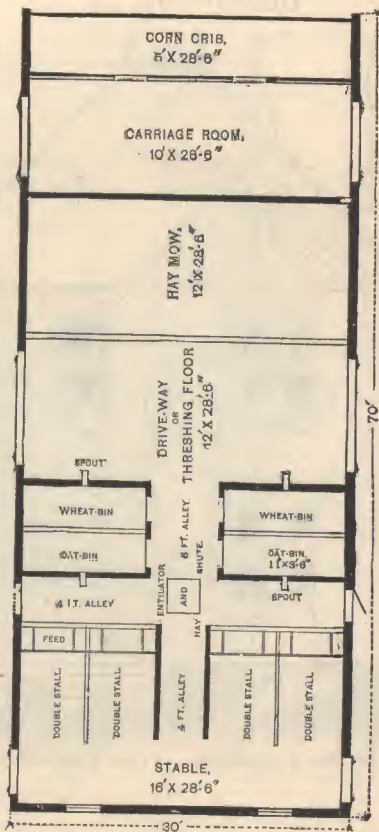
3½ barrels of lime	will do 100 square yards plastering, two coats.
2 " " "	100 " " one coat.
1½ bushels of hair	" 100 " "
1¼ yards good sand	" 100 " "
½ barrel of plaster (stucco),	will hard-finish 100 square yards plastering.
1 barrel of lime	will lay 1,000 brick. (It takes good lime to do it.)
2 " "	1 cord rubble stone.
½ " "	1 perch " (estimating ¼ c'd to perch.)

To every barrel of lime estimate about ⅝ yards of good sand for plastering and brick work.

AMOUNT OF PAINT REQUIRED FOR A GIVEN SURFACE.

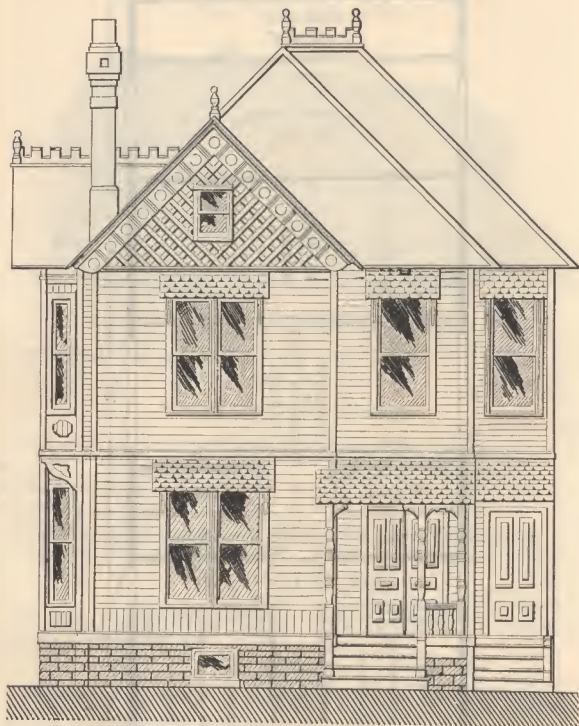
It is impossible to give a rule that will apply in all cases, as the amount varies with the kind and thickness of the paint, the kind of wood or other material to which it is applied, the age of the surface, etc. The following is an approximate rule: Divide the number of square feet of surface by 200. The result will be the number of gallons of liquid paint required to give two coats; or, divide by 18 and the result will be the number of pounds of pure ground white lead required to give three coats.

Rural Architecture.



Plan of Barn—Design No. 26.

DESIGN No. 27.



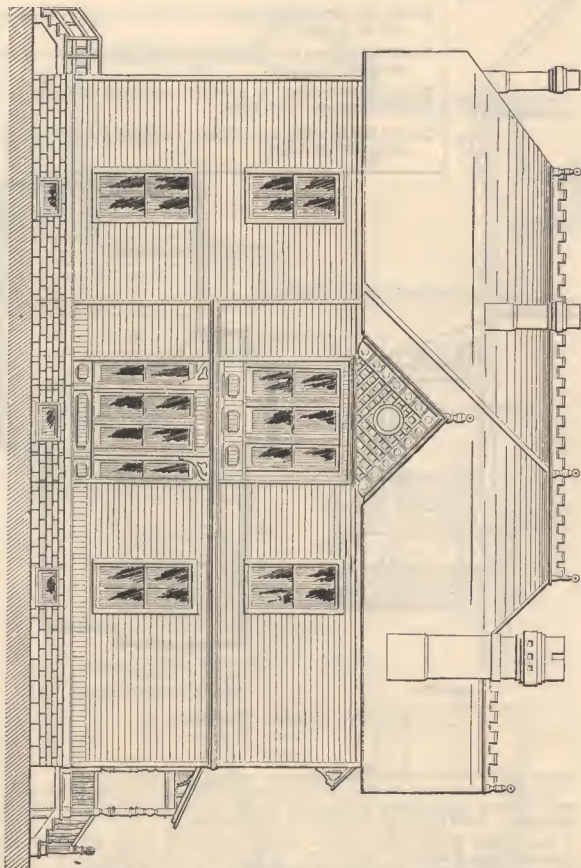
A Model Residence. (Front Elevation.)

WOOD MEASURE.

To find the contents of Cord Wood; *multiply the length, width and height together and divide the product by 128.*

How many Cords in a pile of Wood 4 ft. wide, 5 ft. high and 24 ft. long?

$$4 \times 5 \times 24 = 480 \text{ (cu. ft.)} \div 128 = 3\frac{3}{4} \text{ cords.}$$



No. 27.—Model Residence. (Side Elevation.)

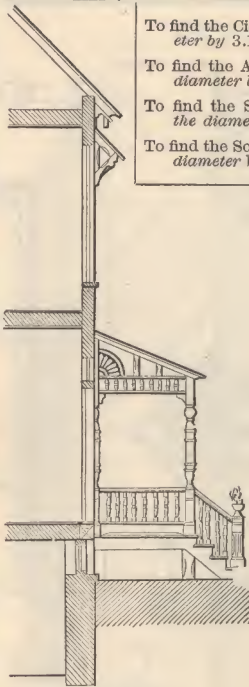
Rural Architecture.

To find the Circumference of a Circle; multiply the diameter by 3.1416.

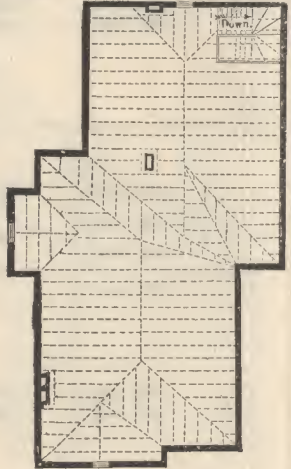
To find the Area of a Circle; multiply the square of the diameter by .7854.

To find the Surface of a Globe; multiply the square of the diameter by 3.1416.

To find the Solidity of a Globe; multiply the cube of the diameter by .5236.



SECTION.



ROOF AND ATTIC PLAN.

No. 27.—Model Residence.

BRICK

are usually made 8 inches long, 4 inches wide, and 2 inches thick.

To the cubic foot, it takes 15 for an *eight* inch, $22\frac{1}{2}$ for a *twelve* inch, and 30 for a *sixteen* inch Wall. The mortar filling up about *one-sixth* of the space. Laid flat ways, it takes $4\frac{1}{2}$ to the sq. ft.

How many Brick will it take to build a house, whose walls are 156 ft. long, 20 ft. high and 16 inches ($1\frac{1}{3}$ ft.) thick; deducting 640 cu. ft. for doors and windows?

$$156 \times 20 \times 1\frac{1}{3} = 4160 \text{ cu. ft.}$$

$$\text{Less } 640 = 3520 \text{ "}$$

$$22\frac{1}{2}$$

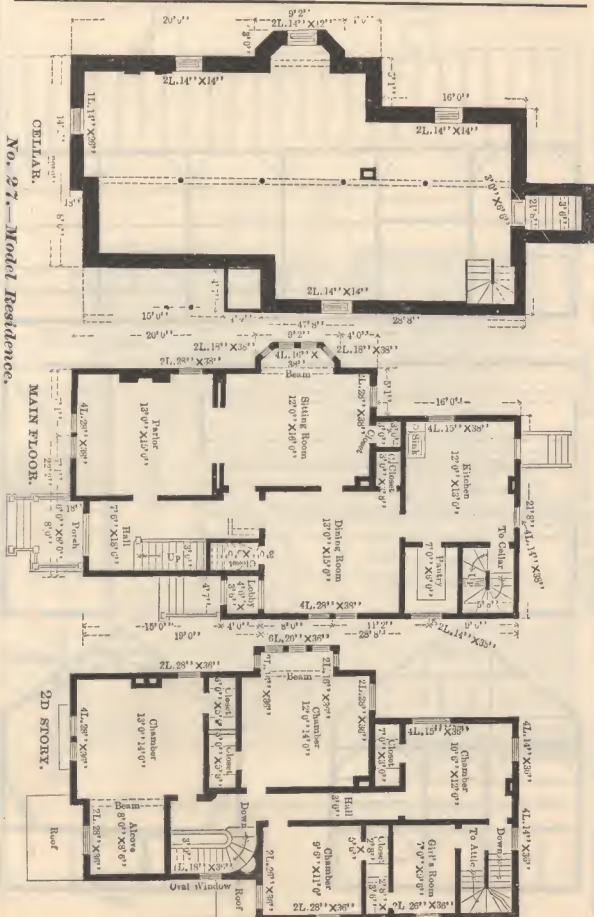
$$\text{Ans. } 79200 \text{ brick.}$$

Rural Architecture.

No. 27.—*Model Residence.*

MAIN FLOOR.

2D STORY.



DESIGN No. 28.

View of Frame at Side

Scale $\frac{1}{8}" = 1 \text{ ft.}$

Plan of Barn

Scale $\frac{1}{8}" = 1 \text{ ft.}$

Model Combination Barn.

The drawings illustrate a barn design with the following features:

- Side Elevation:** Shows a long structure with a gabled roof. The roof has a total width of 74'0" and a height of 22'0". The side walls are 14'0" high. The structure is divided into sections with various roof pitches and truss supports.
- Plan View:** Shows the layout of the barn. It includes a central "DRIVE-WAY" (14'0" wide), a "HOSPITAL" (12'0" wide), and a "HORSE STABLE" (12'0" wide). The main body is divided into sections for "SPACE FOR 16 CATTLE", "SPACE FOR 12 CATTLE", and "FEED STALL". The plan also shows "MANGER FRONT FORMING MEAL BIN, CAP. 100-BU.", "VENTILATOR & HAY SHAFT", and "MANURE DROP" areas.
- Cross-Sections:** Two cross-sections are shown, labeled "a" and "b". They illustrate the internal structure, including the roof truss system and the support for the feed stalls. The sections show the relationship between the roof height, the stall height, and the overall width of the barn.

Scale-1/4"=1 ft. -32'0" Plan of Barn

View of Frame at Side

Scale $\frac{1}{8}" = 1 \text{ ft.}$

MANURE DROP

SPACE FOR 16 CATTLE

MANGER FRONT FORMING MEAL BIN. CAP. 100 BBL.

VENTILATOR

FEEDING & HAY SHAFT

~~MANGER FRONT FORMING MEAL BIN, CAP. 100 BU.~~

SPACE FOR 12 CATTLE

~~MANURE DROP~~

FEED STALL

FEED STALL

FEED STALL

FEED STALL

FEED STALL

DOUBLE
FEED SIALL

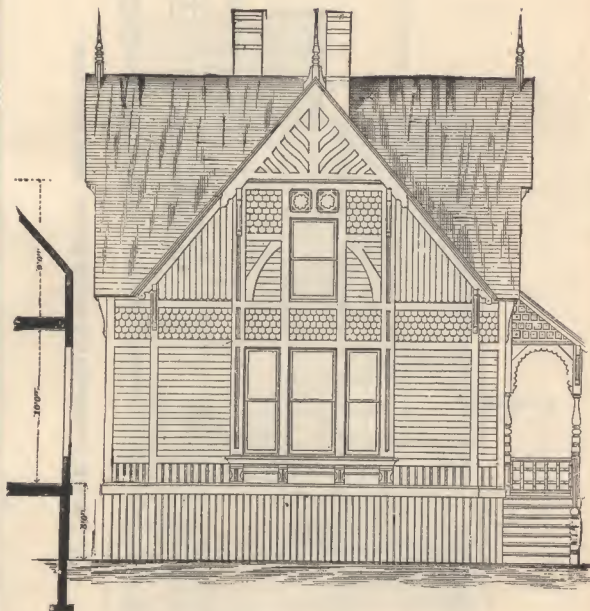
DRIVE-WAY

HOSPITAL

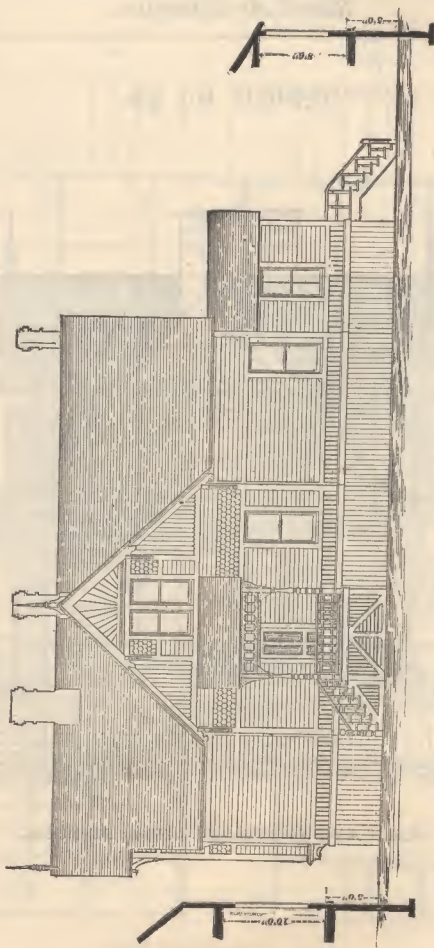
Model Combination Barn.

Rural Architecture.

DESIGN No. 29.



"CHICAGO COTTAGE"—Front Elevation.



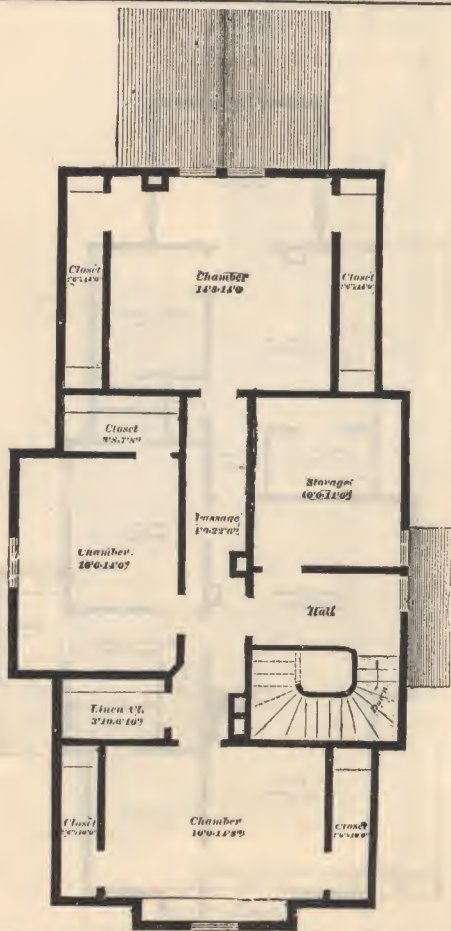
No. 29.—"CHICAGO COTTAGE"—Side Elevation.

Rural Architecture.

No. 29.—"CHICAGO COTTAGE"—Ground Floor Plan.



Rural Architecture.

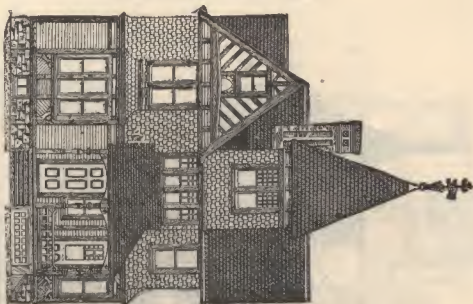


No. 29.—"CHICAGO" COTTAGE—Second Floor Plan.

Rural Architecture.

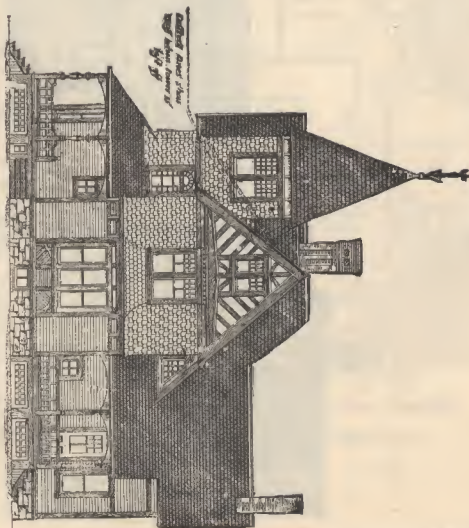
DESIGN No. 30.

FRONT ELEVATION.



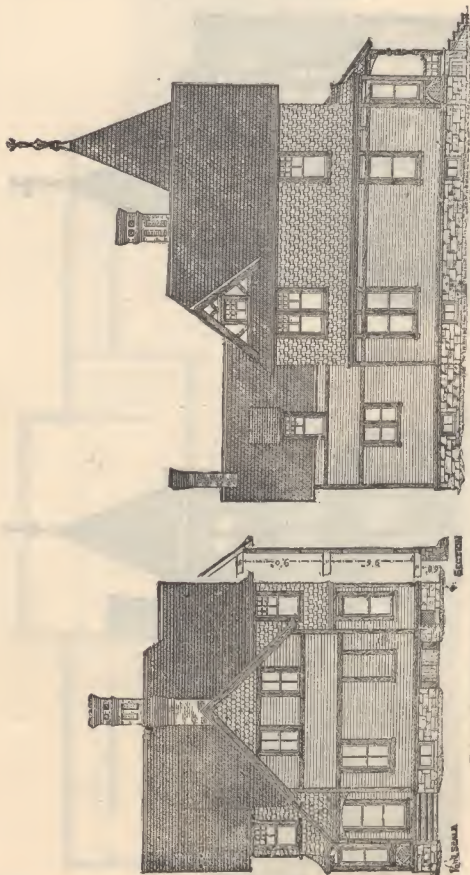
No. 30.—Elevations of Modern Eight Room Cottage.

SIDE ELEVATION.



Plans of this Cottage furnished by Palliser, Palliser & Co., Architects, Bridgeport, Conn.

Rural Architecture.



REAR ELEVATION.

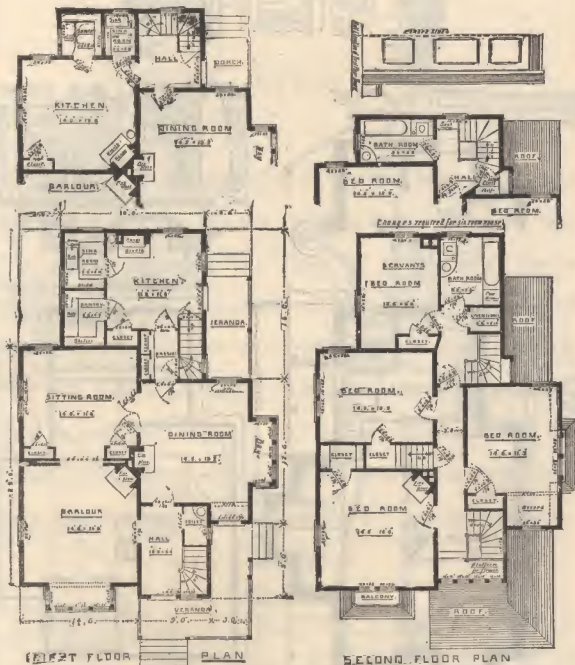
SIDE ELEVATION.

No. 30.—Elevation of Modern Eight Room Cottage.

Plans of this Cottage furnished by Palliser, Palliser & Co., Architects, Bridgeport, Conn.

Rural Architecture.

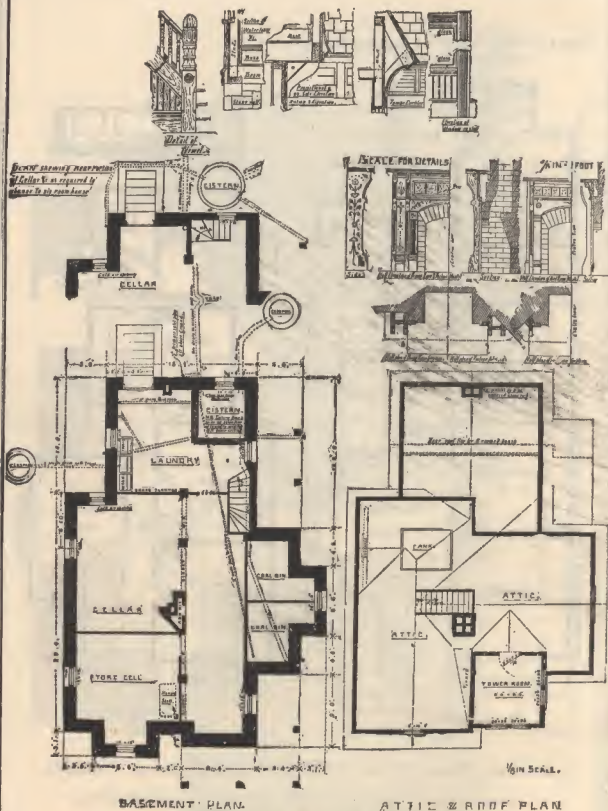
Plan showing changes required for six-room house.



No. 30.—Floor Plans of Modern Eight Room Cottage.

Plans of this Cottage furnished by Palliser, Palliser & Co.,
Architects, Bridgeport, Conn.

Rural Architecture.



No. 30.—Floor Plans of Modern Eight Room Cottage.

Plans of this Cottage furnished by Palliser, Palliser & Co.,
Architects, Bridgeport, Conn.

USEFUL INFORMATION.

The following collection of Useful Information is presented to the reader of this little book in the hope that many of the rules or tables may prove valuable as well as useful. The selection has been made with reference to furnishing a ready solution for the problems most commonly found in every day experience, and if the reader finds in it the information sought after then this little work will be a REFERENCE BOOK in fact as well as in name.

BARREL MEASURE.

To find the contents of a Barrel or Cask; *multiply the square of the average diameter by the depth, and this product by 0034.*

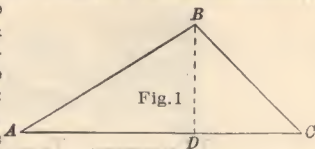
How many Gallons will a Barrel hold, 20 inches in diameter and 32 inches deep? $20 \times 20 \times 32 = 12800 \times .0034 = 43.52$ gals.

TO MEASURE IRREGULAR LAND SURFACES:

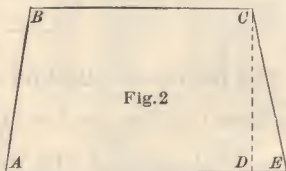
To find the number of acres in a rectangular piece of land (a rectangle has all square corners)—Multiply the length by the breadth (in rods) and divide by 160; or, if the dimensions are measured in feet, divide by 43,-

Useful Information.

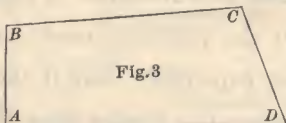
560. To find the number of acres in a triangular piece of land—Multiply the length of one side by half the perpendicular distance between that side and the opposite corner (lengths in rods), and divide the product by 160. **EXAMPLE:** We have a piece of land, ABC , (Fig. 1) the side AC , is 80 rods long, and the distance DB , is 30 rods; $\frac{1}{2}$ of $30=15$, $80 \times 15=1200$, $1200 \div 160=7\frac{1}{2}$, the number of acres in piece.



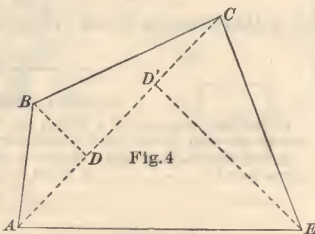
To find the number of acres in a quadrilateral, having two opposite sides parallel, (such is Fig. 2)—Multiply half the sum of the parallel sides by the perpendicular distance between them, in rods, and divide the product by 160. **EXAMPLE:** Given a piece of land $ABCE$, (Fig. 2) with the side BC parallel to AE . $AE=120$ rods, $BC=95$ rods, $CD=70$ rods ($120+95$) $\div 2=107.5$ $107.5 \times 70=12,525$, the number of square rods in piece, $12,525 \div 160=78$ $9\text{-}32$, the number of acres.



To find the area of a field having the opposite sides nearly parallel—Multiply half the sum of two opposite sides by half the sum of the other two sides. **EXAMPLE:** In Fig. 3 the opposite sides AD and BC are nearly parallel as also the sides AB and CD . $AD=120$, $BC=100$, $AB=40$, $CD=55$. Then the area of the figure is expressed as follows: $\text{area}=(120+100) \div 2 \times (40+$



$55 \div 2=5225$. If the measure was taken in rods, $5225 \div 160=32\frac{3}{8}$ nearly, the number of acres in a piece of land of those dimensions. This last rule is not geometrically correct, but in such a case as that given the result is near enough for most purposes. If perfect accuracy is desired, or the piece



Useful Information.

is of more irregular shape, the method indicated in Fig. 4 should be adopted, *i. e.* : divide the whole piece into triangles and obtain the area of each as directed. This will apply to fields of any number of sides.

NAILS.

Nails are put up 100 pounds to the keg.

SIZES.	LENGTH INCHES.	NAILS IN A POUND.	SIZES.	LENGTH INCHES.	NAILS IN A POUND.
3d fine blued	1½	725	6d fence.....	2	80
3d common blued	1¼	400	8d "	2½	50
4d " "	1½	300	10d "	3	30
6d " "	2	150	12d "	3¼	27
8d " "	2½	85	16d "	3½	20
10d " "	3	60	6d finishing....	2	317
12d " "	3¼	50	8d "	2½	208
16d " "	3½	40	10d "	3	126
20d " "	4	20	6d clinching...	2	118
30d " "	4½	16	8d "	2½	80
40d " "	5	14	10d "	3	45
50d " "	5½	11
60d " "	6	8

Five pounds of 4d, or 3¾ pounds of 3d will lay 1,000 shingles. Five and three-quarters pounds of 3d fine will put on 1,000 lath.

Quantity of Seeds Required per Acre.

Wheat.....	1½ to 2 bu.	Beets.....	3	lbs.
Rye.....	1½	Carrots.....	2	"
Oats.....	3	Ruta bagas.....	¾	"
Barley.....	2	Millet.....	½	bu.
Peas.....	2 to 3	Clover, white.....	4	qts.
White beans.....	1½	Clover, red.....	8	"
Buckwheat.....	½	Timothy.....	6	"
Corn, broadcast.....	4	Orchard grass.....	2	bu.
Corn in drills.....	2 to 3	Red top.....	1 to 2	pks.
Corn in hills.....	4 to 8 qts.	Blue grass.....	2	bu.
Broom corn.....	½ bu.	Mixed lawn grass.....	1 to 2	"
Potatoes.....	10 to 15	Tobacco.....	2	oz.

Hills in an Acre of Ground.

40 feet apart.....	27 hills.	8 feet apart.....	680 hills.
35 "	35 "	6 "	1,210 "
30 "	48 "	5 "	1,732 "
25 "	69 "	3½ "	3,556 "
20 "	108 "	3 "	4,840 "
15 "	193 "	2½ "	6,969 "
12 "	302 "	2 "	10,890 "
10 "	435 "	1 "	43,560 "

Useful Information.

GRAIN MEASURE.

To find the capacity of a Bin or Wagon-bed; *multiply the cubic feet by .8* (tenths). For great accuracy, *add $\frac{1}{3}$ of a bushel for every 100 cubic feet.*

To find the cubic ft., *multiply the length, width and depth together.*

Find the capacity of a Bin 4 ft. wide, 5 ft. deep, and 15 ft. long. $4 \times 5 \times 15 = 300$ cubic ft.

To get the *exact* answer, 1 bu. is added for the 300 cu. ft.

Ans. $\overline{240.0}$ bus.
 $240 \times 1 = 241$ bus. exact ans.

How many bus. will a Wagon-bed hold, 10 ft. long, 3 ft. wide, 18 in. or $1\frac{1}{2}$ ft. deep?

A Bed 10 ft. long and 3 ft. wide, will hold 2 bus. for every INCH in depth.

$1\frac{1}{2} \times 3 \times 10 = 45$ cubic feet
 $\overline{.8}$
Ans. $\overline{36.0}$ bus.

EAR CORN MEASURE.

To find the contents of a Corn crib; *multiply the cubic feet by 4 and divide the product by 9*.*

Find the contents of a Corn crib 18 ft. long, 7 ft. wide and 8 ft. high.

*NOTE.—This allows $2\frac{1}{4}$ cubic feet for a bus. It is the rule most generally used, and will hold out in ordinary good corn, even if measured at the time it is cribbed.

$7 \times 8 \times 18 = 1008$ cu. ft.
 $\overline{4}$
 $\overline{9)4032}$
Ans. 448 bus.

CISTERN MEASURE.

To find the capacity of a round Cistern or Tank; *multiply the square of the average diameter by the depth, and take 3-16 of the product.* For great accuracy, *multiply by 1865 instead of taking 3-16.*

Four square Cisterns or Tanks; *multiply the cu. ft. by $2\frac{3}{8}$ (tenths).*

Find the capacity of a round Cistern, 6 ft. in diameter and 8 ft. deep.

Ans. 54 bbls. of $31\frac{1}{2}$ gals.

$6 \times 6 \times 8 = 288$
 $\overline{3}$
 $16\overline{)864}(54 \text{ bbls.}$

How many barrels will a square Tank hold, 10 ft. long, 7 ft. wide and 6 ft. deep? $6 \times 7 \times 10 = 420$ (cubic feet) $\times 2\frac{3}{8} = 99\frac{3}{4}$ bbls. Ans.

LAND MEASURE.

To find the number of acres in a body of land; *multiply the length by the width (in rods), and divide the product by 160.* When the opposite sides are *unequal*, *add them, and take half the sum, for the mean length or width.*

Find how many Acres in a field, 96 rods long and 40 rods wide at one end, and 45 at the other. Ans. $25\frac{1}{2}$ acres.

$2)85 = 40 \times 45$ 96 Length.
 $\overline{42\frac{1}{2}}$ mean width, $42\frac{1}{2}$
160)4080($25\frac{1}{2}$ acres.

SHINGLES

required in a Roof. To the Square Foot, it takes 9 if exposed 4 inches; 8 if exposed $4\frac{1}{2}$ inches, and 7 1-5 if exposed 5 inches to the weather.

Find the number of Shingles required to cover a roof 38 ft. long, and the rafters on each side 14 ft. Shingles exposed $4\frac{1}{2}$ inches.

$28 \times 38 = 1064$ (sq. ft.) $\times 8 = 8512$ shingles. Ans.

To find the length of rafters, giving the roof *one-third* pitch, take *three-fifths* of the width of the building. If the building is 30 feet wide, they must be 18 feet long, exclusive of projection.

Useful Information.

MEASURES OF SURFACE.

Table of Ordinary Units.

144 sq. in.=1 sq. ft.	9 sq. ft.=1 sq. yd.
30¼ sq. yds.=1 sq. rod.	160 sq. rods=1 acre.
640 acres=1 sq. mile or section.	36 sections=1 township.

Comparative Table.

SQ. MI.	ACRES.	SQ. RODS.	SQ. YDS.	SQ. FT.	SQ. IN.
= 640 =		102,400 =	3,097,600 =	27,878,400 =	4,014,489,600
1 =		160 =	4,840 =	43,560 =	6,272,640
		1 =	30¼ =	272¼ =	39,204
			1 =	9 =	1,296
				1 =	144

Surveyors use the following table in measuring land :

625 sq. links make 1 pole.	640 acres make 1 sq. chain.
16 poles make 1 sq. chain.	36 sq. miles (6 miles sq.) township.
10 sq. chains make 1 acre.	

Comparative Table.

TP.	SQ. MILES.	ACRES.	SQ. CHAINS.	POLES.	SQ. LINKS.
1 =	36 =	23,040 =	230,400 =	3,686,400 =	2,340,000,000
	1 =	640 =	6,400 =	102,400 =	6,400,000
		1 =	10 =	160 =	100,000
			1 =	16 =	10,000
				1 =	625

The square foot is used in estimating glazing, stone-cutting, etc.; the square yard in plastering, roofing, paving, etc.; the acre in measuring land.

Solid or Cubic Measure.

1728 cu. inches make one cu. foot.	46,656 cu. inches make one cu. yard.
27 cubic feet make one cubic yard.	
40 cu. ft. of round timber=1 ton.	50 cu. ft. of hewed timber=1 ton.
42 cu. ft. of shipping timber=1 ton.	128 cu. ft.=1 cord.

Timber in one load—English.

50 cu. ft. of square timber.	200 lin. ft. 3 in. planking 12 in. wide.
109 lin. ft. of 6x12 in. "	300 " 2 in. " "
200 " of 6x6 " "	400 " 1½ in. " "
150 " in. planking 12 in. wide.	600 " 1 in. " "

Liquid Measure.

The United States standard for measurement of all liquids is the "wine" or "Winchester" gallon containing 231 cubic inches.

4 gills make one pint.	31½ gallons make one barrel.
2 pints " quart.	2 barrels " hogshead.
4 quarts " gallon.	

Dry Measure.

The Government standard of dry measure of the United States is the "Winchester Bushel" so called, being a cylindrical vessel having an inside

Useful Information.

diameter of $18\frac{1}{2}$ inches, and a depth of 8 inches, and containing 2150.42 cubic inches.

4 gills make one pint.
2 pints " quart.

8 quarts make one peck.
4 pecks " bushel.

Measures of Weight.

The Pound is the United States standard of weight as applied to general purposes, and is the weight of 27.7015 cubic inches of distilled water, at its greatest density (*i. e.* at $39^{\circ} 83''$ Farenheit, the barometer being at 30 inches), and is equivalent to 7,000 Troy gr: ins.

27 11-32 grains make one dram.	25 pounds make one quarter.
16 drams " ounce.	4 quarters make one cwt.
16 ounces " pound.	20 cwt. " ton.

(In some cases the following table for gross weight is used: 28 lb.=1 quar.; 4 quar.=1 cwt.; 20 cwt., or 2240 lbs.=1 ton.

Comparative Table of Weights.

TROY.	APOTHECARIES.	AVOIRDUPOIS.
1 pound equals 5,760 grains.	equals 5,760 grains,	equals 7,000 grains.
1 ounce " 480 "	" 480 "	" 437.5 "
175 pounds " "	175 pounds " "	144 pounds

The half peck, or dry gallon, contains 268.8 cubic inches. Six quarts, dry measure, are equal to nearly 7 quarts, liquid measure.

CARPENTER'S, PLASTERER'S AND BRICKLAYER'S WORK.

To find how many Square Yards in a Floor or Wall; *multiply the length by the width or height, and divide the product by 9.*

How many Square Yards in a Floor 18 ft. long and 14 ft. wide; and how many yards of Carpet $3\frac{1}{4}$ yd. wide, will it take?

To divide by a Fraction, multiply the number by the *denominator*, and divide the product by the *numerator*.

To multiply by a Fraction, multiply by the *numerator* and divide by the *denominator*.

Find how many Square Yards in the four walls and ceiling of a room 18 by 20, 11 ft. high; and the Cost of plastering the same at 15 cts. per sq. yd.

The length of the *four* walls is (twice 20 and twice 18) 76 feet

$$\begin{array}{r} 14 \times 18 = 252 \text{ sq. feet} \\ 9 \overline{)252} (28 \text{ sq. yds.} \\ \underline{18} \\ 72 \\ \underline{72} \\ 0 \end{array}$$

$$\begin{array}{r} 28 \\ 4 \overline{)112} (37\frac{1}{3} \text{ yds. carpt.} \\ \underline{112} \\ 0 \end{array}$$

Ans. { 28 sq. yds.
37 $\frac{1}{3}$ yds. carpt.

$$\begin{array}{r} 76 \times 11 = 836 \text{ sq. ft. in four walls.} \\ 18 \times 20 = 360 \text{ " " ceiling.} \\ 9 \overline{)1196} (133 \text{ sq. yds. nearly.} \\ \underline{900} \\ 296 \\ \underline{270} \\ 26 \end{array}$$

Ans. \$19.95 for plastering.

which multiplied by the height, gives the sq. ft. in the walls. The length multiplied by the width, gives the sq. ft. in the ceiling.

To measure Square Timbers: *multiply the length, width and thickness together, and divide the product by 12.*

How many square feet in a joist 2 by 8, 18 ft. long?

$$2 \times 8 \times 18 = 288 \div 12 = 24 \text{ ft. Ans.}$$

Sill 8 by 8, 22 ft. long? $8 \times 8 \times 22 = 1408 \div 12 = 117\frac{1}{3} \text{ ft. Ans.}$

Useful Information.

Table showing Freight per Bushel from 1 to 60 cts. per 100 lbs.

The following table shows at once the amount of freight *per bushel* on wheat, corn or oats at any rate per hundred pounds, from one to sixty cents. The heavy figures over the top of the columns signify as follows: 60 wheat; 56 corn; 32 oats; being the number of pounds each kind of grain weighs to the bushel. **EXAMPLE:** If the rate of freight from your shipping station to Chicago or any other market is 19 cents *per hundred*, to find what it amounts to *per bushel* of wheat look in the column headed 60, and opposite the figures 19 in the column headed cents you will find .114, which means that the freight on your wheat will be eleven cents and four mills per bushel; on corn .106 or on oats .061.

cts.	60	56	32	cts.	60	56	32	cts.	60	56	32
Freight per 100 pounds.	1	.00 6	.00 3	21	.12 6	.11 8	.06 7	41	.24 6	.23 0	.13 1
	2	.01 2	.01 1	22	.13 2	.12 3	.07 0	42	.25 2	.23 5	.13 4
	3	.01 8	.01 7	23	.13 8	.12 9	.07 4	43	.25 8	.24 1	.13 8
	4	.02 4	.02 2	24	.14 4	.13 4	.07 7	44	.26 4	.24 6	.14 1
	5	.03 0	.02 8	25	.15 0	.14 0	.08 0	45	.27 0	.25 2	.14 4
	6	.03 6	.03 4	26	.15 6	.14 6	.08 3	46	.27 6	.25 8	.14 7
	7	.04 2	.03 9	27	.16 2	.15 1	.08 6	47	.28 2	.26 3	.15 0
	8	.04 8	.04 5	28	.16 8	.15 7	.09 0	48	.28 8	.26 9	.15 4
	9	.05 4	.05 0	29	.17 4	.16 2	.09 3	49	.29 4	.27 4	.15 7
	10	.06 0	.05 6	30	.18 0	.16 8	.09 6	50	.30 0	.28 0	.16 0
	11	.06 6	.06 2	31	.18 6	.17 4	.09 9	51	.30 6	.28 6	.16 3
	12	.07 2	.06 7	32	.19 2	.17 9	.10 2	52	.31 2	.29 1	.16 6
	13	.07 8	.07 3	33	.19 8	.18 5	.10 6	53	.31 8	.29 7	.17 0
	14	.08 4	.07 8	34	.20 4	.19 0	.10 9	54	.32 4	.30 2	.17 3
	15	.09 0	.08 4	35	.21 0	.19 6	.11 2	55	.33 0	.30 8	.17 6
	16	.09 6	.09 0	36	.21 6	.20 2	.11 5	56	.33 6	.31 4	.17 9
	17	.10 2	.09 5	37	.22 2	.20 7	.11 8	57	.34 2	.31 9	.18 2
	18	.10 8	.10 1	38	.22 8	.21 3	.12 2	58	.34 8	.32 5	.18 6
	19	.11 4	.10 6	39	.23 4	.21 8	.12 5	59	.35 4	.33 0	.18 9
	20	.12 0	.11 2	40	.24 0	.22 4	.12 8	60	.36 0	.33 6	.19 2

Table showing the number of Pounds to the Bushel.

Wheat.....	60	Hung'n Grass Seed.....	45	Apples, Green.....	56
Corn, shelled.....	56	Blue Grass Seed.....	14	Dried Apples.....	24
Corn, in the ear.....	70	Millet Seed.....	50	Dried Peaches.....	33
Rye.....	56	Red Top Seed.....	14	Cornmeal.....	48
Oats.....	32	White Beans.....	60	Bran.....	20
Barley.....	48	Castor Beans.....	46	Malt.....	38
Buckwheat.....	52	Peas.....	60	Stone Coal.....	80
Timothy Seed.....	45	Potatoes.....	60	Charcoal.....	22
Clover Seed.....	60	Sweet Potatoes.....	55	Salt.....	65
Flax Seed.....	56	Onions.....	57	Lime, unslacked.....	80
Hemp Seed.....	44	Turnips.....	55	Plastering Hair.....	8

A bushel contains 2150.4 cubic inches. A Gallon 231 cu. in.

A box 13 by 13 and 12 $\frac{3}{4}$ inches deep, will practically hold a bushel.

A cubic foot of Water weighs 62 $\frac{1}{2}$ pounds. 32 cu. ft. weigh a Ton.

Cash Memoranda.

[illegible]

[illegible]

Cash Memoranda.

[illegible]

[illegible]

[illegible]

[illegible]

Memoranda.

Memoranda.

Memoranda.





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